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F1B B2L1C B2L4X  
B7H HLK

(56) Documents Cited  
GB 2272942 A GB 2249132 A GB 2247919 A  
GB 1079698 A WO 95/16123 A1 WO 94/07019 A1  
US 5307779 A US 4930483 A

(58) Field of Search  
UK CL (Edition O) F1B  
INT CL<sup>6</sup> F02M 27/02

(54) Catalytic fuel treatment for improving combustion efficiency

(57) Apparatus, for improving the combustion efficiency of fuel, comprises a catalyst alloy/amalgam made from a formulation of four or more of the metals antimony, barium, cadmium, calcium copper, gold, lead, mercury, nickel, palladium, platinum, ruthenium, silver, tin, zinc, which fuel catalyst may be used as a coating or lining to the fuel tank and or its internal components and or the fuel line which transports the fuel to the point of combustion.

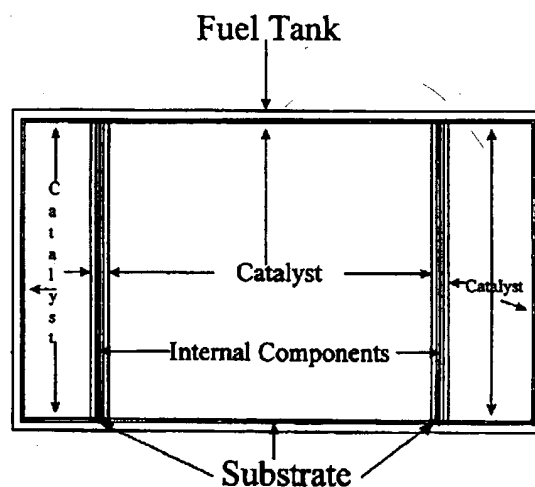


Figure 4

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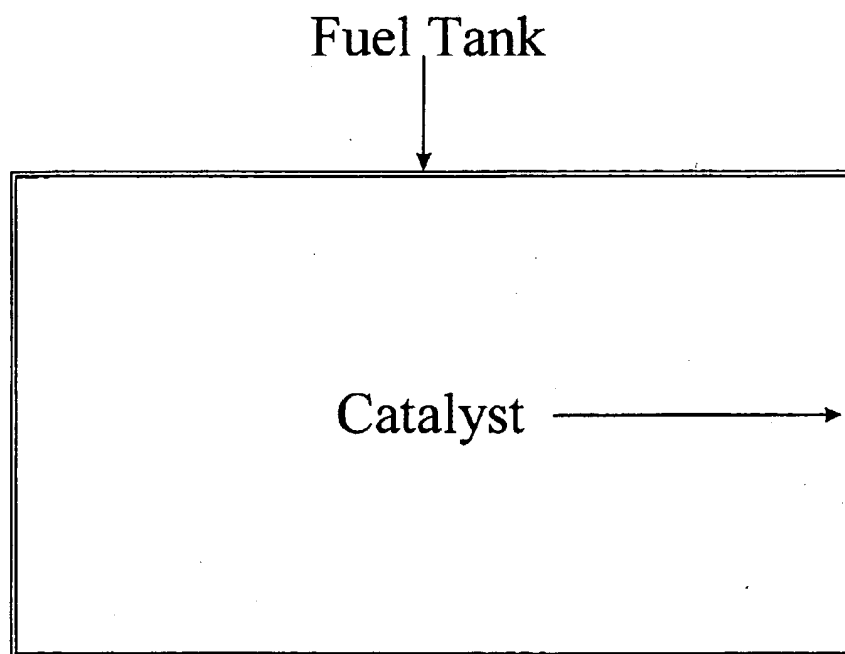


Figure 1

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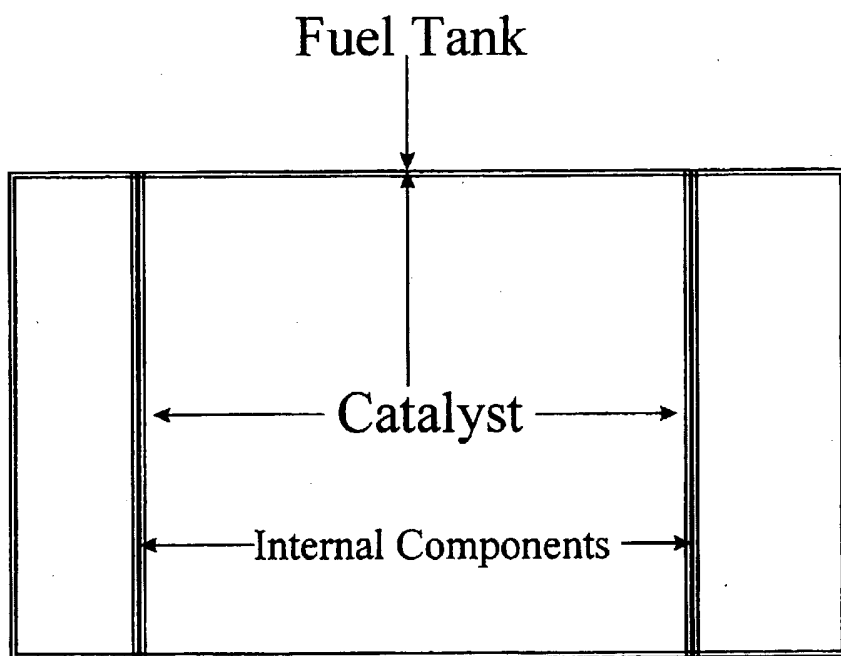


Figure 2

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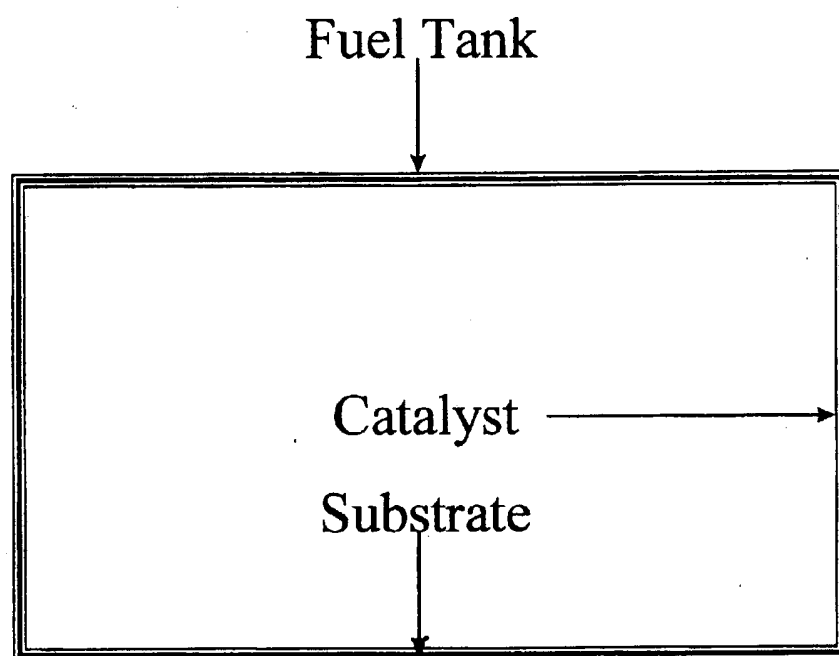


Figure 3

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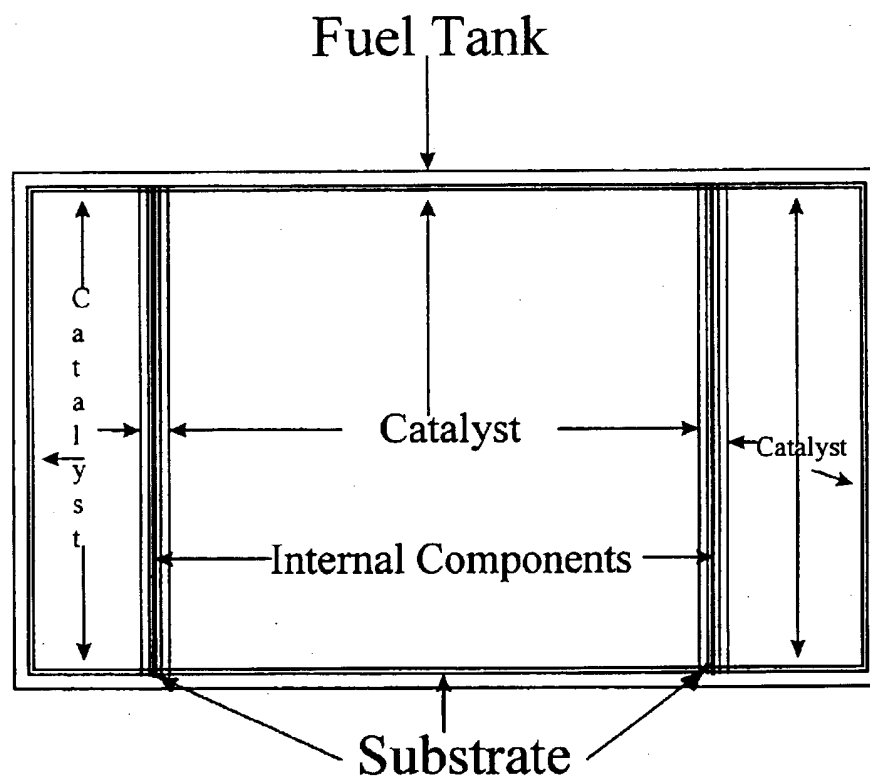


Figure 4

5/b

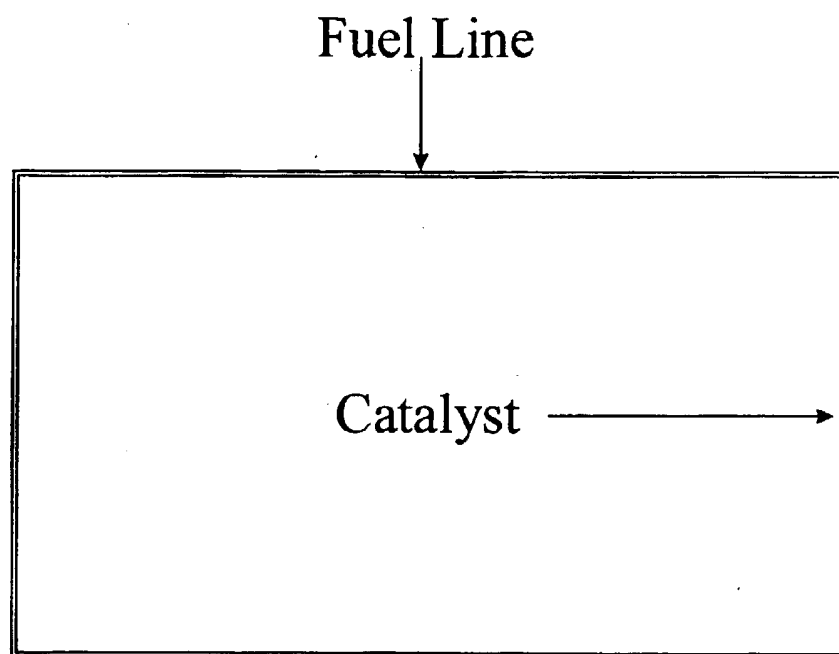


Figure 5

6/b

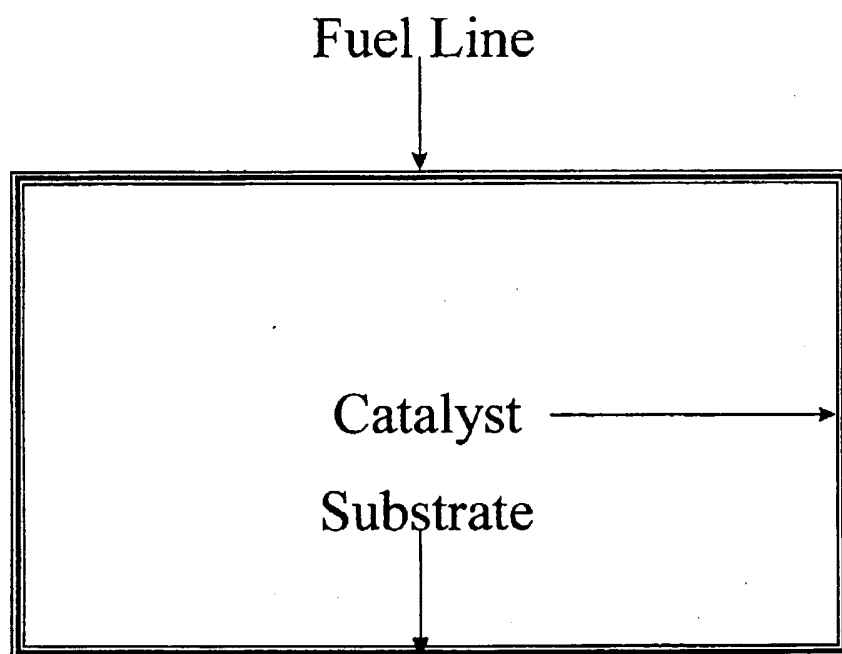


Figure 6

IMPROVING COMBUSTION EFFICIENCY

This invention relates to a device for improving the combustion efficiency of hydrocarbon fuel.

Fuel additives in the form of a metallic alloy/amalgam which attempt to improve the combustion efficiency of hydrocarbon fuel have been known for some time. In UK Patent Number 12689/66 published on 16 August, 1967 an alloy/amalgam for use in Internal Combustion Engines Fuel was proposed. However the devices were unreliable and unpredictable in their effect on any particular fuel.

Considerable use of catalytic reactions is made in eliminating the products of incomplete combustion from exhaust gases, whereas this present invention is concerned with the novel and efficient use of catalysts to improve the combustion efficiency and thereby reduce the products of incomplete combustion from the exhaust. It also has the effect of improving fuel economy.

Apparatus according to the present invention, for improving the efficiency of hydrocarbon fuel combustion, comprises a fuel catalyst made from a formulation of metals, and is characterised in that the said fuel catalyst is an alloy/amalgam of four or more of the metals antimony, barium, cadmium, calcium, copper, gold, lead, mercury, nickel, palladium, platinum, ruthenium, silver, tin, zinc.

The precise formulation of the alloy/amalgam is varied according to the characteristics of the particular fuel to be combusted and the form of combustion chamber in which combustion is to take place and so as to optimise the efficiency of combustion at economic catalytic cost. The fuel may be, for example, any grade of oil, petrol, liquid petroleum gas, natural gas or diesel.

Preferably, the catalyst is applied as a lining or coating to the fuel storage tank and its internal components.

The catalyst may be formed by, for example, coating or lining the fuel tank and or its internal components and or the fuel lines which transport the fuel from the storage tank to the point of combustion in the furnace, boiler or engine. Alternatively, the catalyst may be formed integrally with such a component as the fuel tank and or the fuel lines. It is presently preferred that the catalyst be formed integrally with the fuel tank and its internal components. It is presently preferred that the catalyst be coated onto mesh of steel or other suitable material to provide extensive surface area with minimum volume of catalyst. It is also presently preferred that the catalyst consists of, apart from impurities, an alloy / amalgam of four or more of the following metals, and in the approximate percentages by weight:-

- 0 to 40%wt antimony;
- 0 to 20%wt barium;
- 0 to 20%wt cadmium;
- 0 to 20%wt calcium;
- 0 to 10 %wt gold;
- 0 to 20%wt lead;
- 0 to 20%wt mercury;
- 0 to 20%wt nickel;
- 0 to 10%wt palladium;
- 0 to 10%wt platinum;
- 0 to 10%wt ruthenium;
- 0 to 10%wt silver;
- 0 to 80 %wt tin;
- 0 to 20%wt zinc;

The choice of metals and percentages thereof is varied according to the type of fuel to be treated and the characteristics of the combustion chamber.



In one embodiment, the apparatus of the present invention comprises a coating to the inside of a fuel tank.

In another embodiment, the apparatus of the present invention is similar to that described above save that the coating is applied to the internal components of the fuel tank.

In another embodiment, the apparatus of the present invention is similar to that described above save that the coating is applied to the inside of a fuel tank and its internal components.

In another embodiment, the apparatus of the present invention is similar to that described above save that the coating is applied to an intermediate substrate to aid adhesion to the inside of the fuel tank and or its internal components.

In another embodiment, the catalyst is applied as a coating to the fuel line.

In another embodiment, the catalyst is applied to an intermediate substrate in the fuel line.

The effect of the device is to improve the combustion characteristics of the fuel providing a cleaner burn, which avoids the build-up of carbon deposits and inhibits smoke emissions.

Apparatus in accordance with the present invention will now be illustrated, by way of example only, with reference to the accompanying drawings in which:-

- Figure 1 is a longitudinal section through a fuel tank with no internal components and no intermediate substrate;
- Figure 2 is a longitudinal section through a fuel tank with internal components and no intermediate substrate;
- Figure 3 is a longitudinal section through a fuel tank with no internal components and an intermediate substrate;
- Figure 4 is a longitudinal section through a fuel tank with internal components and an intermediate substrate;
- Figure 5 is a longitudinal section through a fuel line with no intermediate substrate;
- Figure-6 is a longitudinal section through a fuel line with an intermediate substrate;

In an internal combustion engine, it is found that there is a smoother more efficient and reliable engine which lasts longer, the engine oil lasting longer and the pollutants and particulates in the exhaust emissions being reduced under almost all conditions of the operation of the engine.

In a furnace or boiler, it is found that there is a reduction in pollutants in the emissions and a higher energy yield under almost all operating conditions.

The catalyst has been found to reduce gelling and inhibit bacterial growth in the fuel tank in certain types of fuel.

CLAIMS

1. Apparatus for improving the efficiency of fuel combustion, comprises a fuel catalyst made from a formulation of metals, and is characterised in that the said fuel catalyst is an alloy/amalgam of four or more of the metals antimony, barium, cadmium, calcium, copper, gold, lead, mercury, nickel, palladium, platinum, ruthenium, silver, tin, zinc.
2. Apparatus comprising the fuel catalyst according to claim 1 wherein the fuel catalyst is formed as a coating to the fuel tank and or its components.
3. Apparatus according to claim 1 or claim 2 wherein the fuel catalyst is formed as a lining to the fuel tank and or its components by use of an intermediate substrate or substrates.
4. Apparatus according to claim 1 wherein the fuel catalyst is formed as a coating to the fuel line.
5. Apparatus according to claim 1 wherein the fuel catalyst is formed as a lining to the fuel line by use of an intermediate substrate or substrates.
6. Apparatus according to any preceding claim wherein the fuel catalyst consists of, apart from impurities, 0 to 40%wt antimony, 0 to 20%wt barium, 0 to 20%wt cadmium, 0 to 20%wt calcium, 0 to 10%wt gold, 0 to 20 %wt lead, 0 to 20%wt mercury, 0 to 20%wt nickel, 0 to 10%wt palladium, 0 to 10%wt platinum, 0 to 10%wt ruthenium, 0 to 10%wt silver, 0 to 80 %wt tin, 0 to 20 %wt zinc.



Application No: GB 9620567.9  
Claims searched: 1 to 6

Examiner: John Twin  
Date of search: 22 November 1996

**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.O): F1B

Int Cl (Ed.6): F02M 27/02

Other:

**Documents considered to be relevant:**

Category	Identity of document and relevant passage	Relevant to claims
X	GB 2272942 A (Sherwood-Rogers)	1 at least
X	GB 2249132 A (Deadman)	1,4 at least
X	GB 2247919 A (Fuel Dynamics) - see eg p.4, lines 21-35	1 at least
X	GB 1079698 (Carbon Flo)	1 at least
X	WO 95/16123 A1 (Ecology Pure Air)	1 at least
X	WO 94/07019 A1 (Marlow) - see eg examples 7 and 13	1 at least
X	US 5307779 (Wood et al.) - see eg col.4, lines 22-35	1 at least
X	US 4930483 (Jones)	1 at least

X Document indicating lack of novelty or inventive step  
Y Document indicating lack of inventive step if combined with one or more other documents of same category.

& Member of the same patent family

A Document indicating technological background and/or state of the art.  
P Document published on or after the declared priority date but before the filing date of this invention.

E Patent document published on or after, but with priority date earlier than, the filing date of this application.